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Description of a new species of *Leiurus* Ehrenberg, 1828 (Scorpiones, Buthidae) from the South of Jordan

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Description of a new species of *Leiurus* Ehrenberg, 1828 (Scorpiones, Buthidae) from the South of Jordan. - A new species of buthid scorpion from the south of Jordan, belonging to the genus *Leiurus* Ehrenberg, is described on the basis of a female collected NW of Al-Mudawwarah. The new species, *Leiurus jordanensis* sp. n., can be readily distinguished from the only other known species in the genus, *Leiurus quinquestriatus* (Ehrenberg, 1828), which is yellowish, by its generally blackish brown coloration.

Key-words: Scorpion - new species - *Leiurus jordanensis* sp. n. - Buthidae - Al-Mudawwarah - Jordan.

INTRODUCTION

The genus *Leiurus* was established by Ehrenberg 1828 (in Hemprich & Ehrenberg, 1828) as a subgenus of *Androctonus* for *Androctonus* (*Leiurus*) *quinquestriatus* Ehrenberg. For many years, most taxonomists have attributed the authorship of both genus and species to Hemprich & Ehrenberg (1829) (e.g., Kraepelin, 1891; Vachon, 1949, 1952; Levy & Amitai, 1980; Francke, 1985; Sissom, 1990). This error was finally clarified by Braunwalder & Fet (1998) (see also Fet, 1997 and Fet & Lowe, 2000 for details).

At the time of its description, *Leiurus* was considered to be a subgenus of *Androctonus* (Ehrenberg, 1828). Several authors (e.g., Kraepelin, 1891) regarded *Leiurus* as a synonym of the genus *Buthus* Leach. Finally Vachon (1949) raised *Leiurus* to generic rank, containing, at that time, only one species, *Leiurus quinquestriatus* Ehrenberg.

Vachon (1949) was confident that the genus *Leiurus* was monotypic and he restrained himself from revising its intraspecific structure. Two subspecies were, however, considered by Vachon (1949) to be valid: *Leiurus quinquestriatus quinquestria-*

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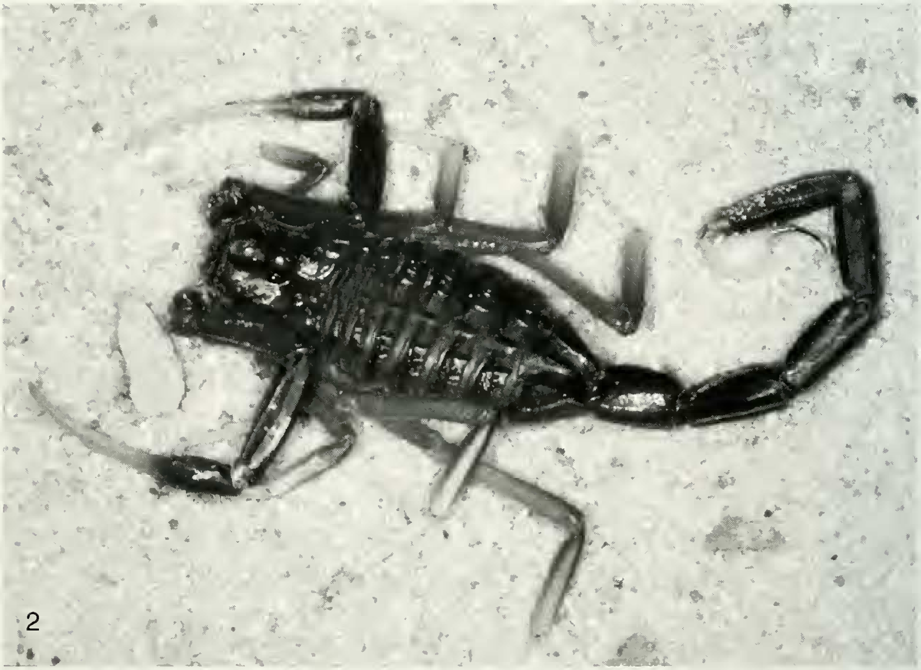


FIGS 1-2

1. The natural habitat of *Leiurus jordanensis* sp. n. 2. *Leiurus jordanensis* sp. n., female holotype in the natural habitat.

tus (Ehrenberg, 1828) and *Leiurus quinquestriatus hebraeus* (Birula, 1908). The systematic position of *Leiurus quinquestriatus hebraeus* was discussed by Levy *et al.* (1970), who presented tables which differentiate this subspecies from *L. q. quinquestriatus*. The position of the two subspecies was again discussed by Levy and Amitai (1980) in their monographic work *Fauna Palaestina (Scorpiones).* The genus and species *Leiurus quinquestriatus* has also been the subject of more regional studies. In his treatment of the scorpions of Saudi Arabia, Vachon (1979) made reference to *Leiurus quinquestriatus*, without, however, commenting on its rank as a subspecies. He made a few remarks concerning the 'variety' *Androctonus quinquestriatus brachycentrus* (Ehrenberg, 1828) and suggested that more material would be necessary to precisely define the variability of the coloration of metasomal segment five. More recently, in a study on the scorpions of Yemen, Sissom (1994) also made reference to *Leiurus quinquestriatus*, but he decided to not assign the Yemen population to any particular subspecies.

Very few records are available regarding the presence of *Leiurus quinquestriatus quinquestriatus* or *Leiurus quinquestriatus hebraeus* in Jordan (Vachon, 1966; Levy & Amitai, 1980; Fet & Lowe, 2000), and the species *L. quinquestriatus* apparently is not present in the south of that country.

During recent field work in the south of Jordan, one of us (DM), collected an unusual specimen of scorpion. The study of this specimen, revealed that it is a new species of *Leiurus*, which is described below.

TAXONOMY

Leiurus jordanensis sp. n. Figs 2-8

Type material: 1 female holotype, Jordan, NW of Al-Mudawwarah, alt. ca. 700 m (29° 19' 22.3" N, 35° 59' 24.3" E), VII-2000 (D. Modry coll.). Deposited in the Muséum d'histoire naturelle, Genève.

Etymology: The specific name refers to the country in which the new species was found.

DIAGNOSIS

The new species can clearly be placed in the genus *Leiurus* Ehremberg on account of the presence of 5 carinae on tergites I and II. It is distinguished from *Leiurus quinquestriatus* (Ehrenberg, 1828), the only previously known species of the genus, by the following characters: The new species is generally blackish brown, whereas L. *quinquestriatus* is yellowish, in some cases with brown spots on the carapace, tergites and, in particular, on metasomal segments V. The ventrolateral carinae of metasomal segment V are armed with spinoid granules, and the anal arch is composed of 3 spinoid lobes, whereas in *L. quinquestriatus* the ventrolateral carinae are armed with 3-4 rounded lobes and the anal arch is composed of 3 rounded lobes. The metasomal carinae are strongly marked and intercarinal spaces are smooth to shagreened, whereas in *L. quinquestriatus* the carinae are moderately marked and less regular, and the intercarinal spaces show a moderate to weak granulation. Morphometrical values of the female holotype of *L. jordanensis* sp. n. are different from those of a female of *L. quinquestriatus* with the same total length (see Table I).

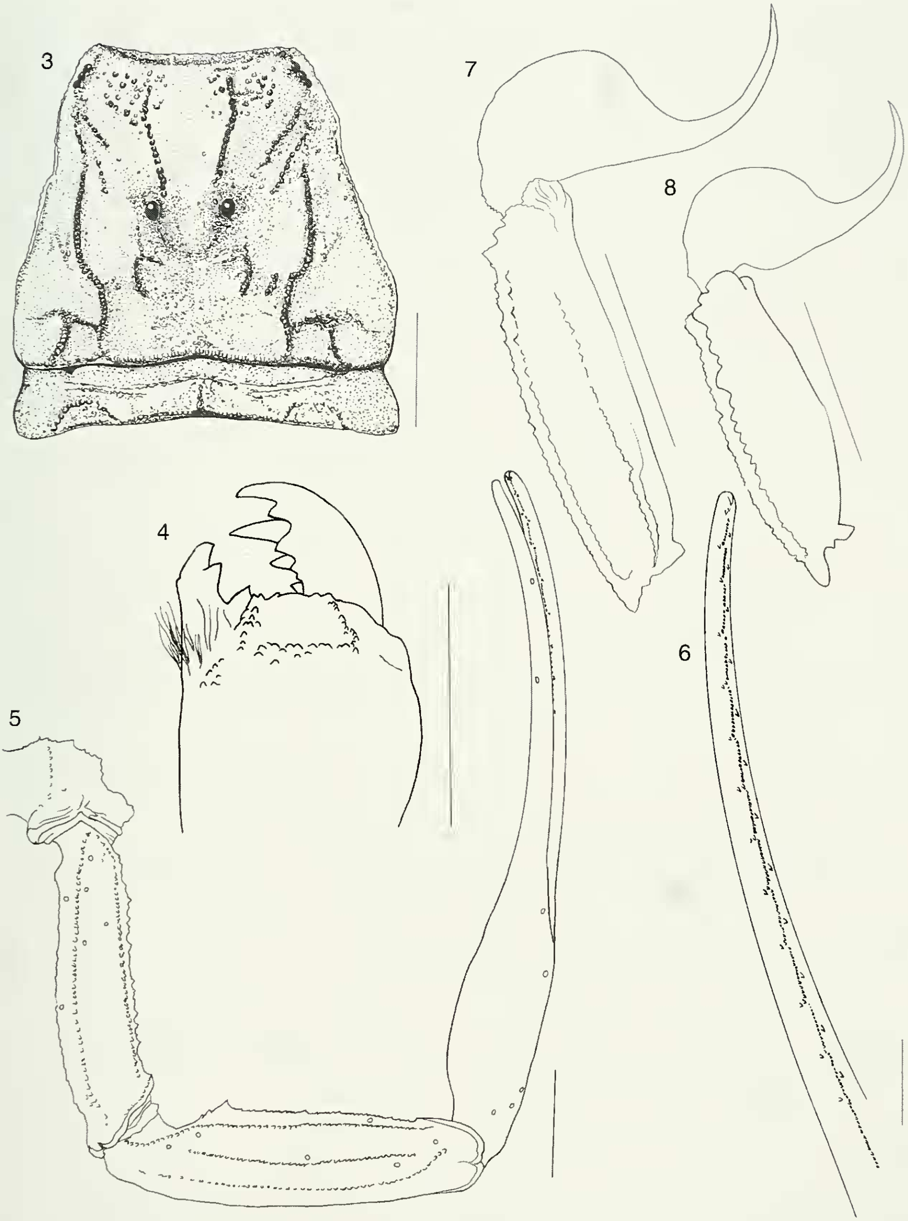
TABLE I. Comparative morphometric values (in mm) of the female holotype of *Leiurus jordanensis* sp. n. and of a female of *L. quinquestriatus* from Saudi Arabia.

	L. jordanensis sp. n.	*L. quinquestriatus*
Total length	74.0	74.0
Carapace:		
- length	8.5	8.3
- anterior width	6.4	6.0
- posterior width	10.5	10.4
Metasomal segment I:		
- length	6.0	5.2
- width	4.6	5.6
Metasomal segment V:		
- length	10.6	9.8
- width	3.0	3.8
- depth	2.8	3.7
Vesicle:		
- width	3.4	3.6
- depth	3.2	3.4
Pedipalp:		
- Femur length	10.1	8.1
- Femur width	2.3	2.4
- Patella length	11.2	9.4
- Patella width	2.8	3.3
- Tibia length	19.5	16.5
- Tibia width	2.3	2.7
- Tibia depth	2.6	3.0
Movable finger:		
- length	13.6	11.2

DESCRIPTION (based on female holotype)

Coloration. Generally blackish brown with some diffuse pale spots on prosoma and mesosoma. Prosoma: carapace mostly blackish brown, darker anteriorly; lateral margins with some narrow lighter zones. Mesosoma: blackish brown, with some lighter zones on each side of the median carinae on segments I and II. Metasoma: all segments blackish brown. Vesicle pale yellow; aculeus yellowish at the base and reddish at its extremity. Venter reddish yellow; sternite VII with brown spots. Chelicerae yellowish with dense reticulated dark spots; teeth blackish. Pedipalps: blackish brown overall except for yellowish fingers of tibia; rows of granules on dentate margins of fingers dark reddish. Legs with the four proximal segments brownish and the three distal ones yellowish.

Morphology. Prosoma: Anterior margin of carapace weakly emarginate. Carapace carinae strongly developed; central median, posterior median, anterior median, central lateral and central median carinae strong; posterior median carinae terminating distally in a small spinoid process extending very slightly beyond the posterior margin of the carapace. Intercarinal spaces with some irregular granules, the rest of the surface rather smooth, especially laterally and distally. Median ocular tubercle only slightly anterior to the center of the carapace, almost central in position; median eyes separated



Figs 3-8

3-7. *Leiurus jordanensis* sp. n., female holotype. 3. Carapace and mesosomal tergite I, dorsal aspect. 4. Chelicera, dorsal aspect. 5. Right pedipalp, dorsal aspect showing arrangement of trichobothria. 6. Granulations on the dentate margin of the movable finger of the pedipalp-tibia. 7. Metasomal segment V and telson, lateral aspect. 8. *Leiurus quinquestriatus* female. Metasomal segment V and telson, lateral aspect. Scales: figures 3-6 = 3 mm; figures 7-8 = 5 mm.

by more than two times their diameter. Four pairs of lateral eyes; the fourth eye only half the size of the others three. Mesosoma: Tergites I-II pentacarinate; III-IV tricarinate. All carinae strong, granular; each carina terminating distally in a spinoid process extending slightly beyond the posterior margin of the tergite. Median carinae on tergite I moderate to strong; on II-VI strong, crenulate and terminating distally in a spinoid process extending very slightly beyond the posterior margin of the tergite. Tergite VII pentacarinate, with lateral pairs of carinae strong and fused; median carinae present in the proximal half, moderate to strong. Intercarinal spaces weakly granular, almost smooth, except for the strongly granulated lateral margins of tergites III-VI. Sternites: Lateral carinae absent from sternite III, moderate to weak on sternites IV-VI, strong, crenulate on VII. Submedian carinae absent on sternites III-V, moderate to weak on VI, strong and crenulate on VII. Pectines moderately long; pectinal teeth count 30-30. Metasoma: Segments I-III with 10 carinae, crenulate; lateral inframedian carinae on I moderate to strong, crenulate; on II present only in posterior half, crenulate; on III limited to posterior third; segment IV with 8 keels. Dorsolateral carinae on all metasomal segments moderate to strong, without any enlarged denticles distally. All the other carinae on segments I-IV moderate to strong. Segment V with 5 keels; ventromedian carinae strong, with several strongly spinoid granules distally; anal arch with 3 spinoid lobes. Dorsal furrows of all metasomal segments moderately to weakly developed, smooth; intercarinal spaces practically smooth, with only a few strong granules on the ventral surface of segment V. Telson smooth, subaculear tubercle absent. Chelicerae with two reduced denticles at the base of the movable finger, the distal denticle double the size of the basal one (cf. Vachon, 1963). Pedipalps: Trichobothrial pattern orthobothriotaxic, type A (cf. Vachon, 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975). Femur pentacarinate; all carinae strongly crenulate. Patella with 7 keels; all carinae moderate to strong; internal carinae with one spinoid granule distally. Tibia slender, with elongated fingers; all carinae weakly granular, almost vestigial. Dentate margin of movable and fixed fingers composed of 12 almost linear rows of granules. Legs: Ventral side of tarsi with numerous setae not arranged in straight rows. Strong patellar spurs present on legs III and IV, strong pedal spurs present on all legs. Measurements. See Table I.

ECOLOGY AND BIOGEOGRAPHY

Habitat: The area in which *Leiurus jordanensis* sp. n. was collected is composed of sandstone cliffs surrounded by flat sand fields, small sand dunes and xeric hammada with scattered *Haloxylon persicum* and *Anabasis* sp. bushes. The specimen was collected during the night (22:10h) sitting at the entrance of a very deep crevice in the zone between the vertical sandstone cliff and the surrounding sand dune. The habitat lies at the margin of extensive sand dunes, which penetrate from Saudi Arabia into Jordanian territory. Some psammophilous Arabian faunal elements, such as *Acanthodactylus tilburyi* (Reptilia, Lacertidae), reach at this place the NW boundary of their distribution (Modry *et al.*, 1999).

The habitat of *L. jordanensis* sp. n. seems to differ from the ecological requirements described for *L. quinquestriatus hebraeus* by Levy & Amitai (1980). In their ecological notes these authors stated: "It is found on various types of soil: terra rossa, basalt, rendzina, loess and stony desert. It does not occur in the Coastal Plain, on Mount Carmel or in plains and valleys with sand dunes or heavy soil".

Geographical distribution: According to Fet & Lowe (2000), *Leiurus quinquestriatus* is distributed throughout Algeria, Chad, Egypt, Ethiopia, Libya, Mali, Niger, Somalia, Sudan, and Tunisia in Africa, and the Sinai Peninsula, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates and Yemen in Asia. The African populations correspond largely with the nominal subspecies, *L. quinquestriatus quinquestriatus*, whereas those in Asia belong to the nominal subspecies *L. quinquestriatus hebraeus*. According to Levy *et al.* (1970), the Isthmus of Suez is apparently the border between the two subspecies, but no intermediate population has been clearly defined. Moreover, in a map Levy & Amitai (1980: fig. 3) indicate the records for *Leiurus* in Israel and the Sinai Peninsula. Only a few localities are indicated in Jordan, all of which are situated very close to the border with Israel. In his studies on Saudi Arabian scorpions, Vachon (1979) merely indicated a number of localities for *L. quinquestriatus* in the central and western regions of the country. No localities were cited in the region closer to the Jordanian border.

The distribution of the new species therefore appears to be limited to an enclave within the area in which *Leiurus quinquestriatus* is distributed. In this enclave, other endemic elements are present. One example is the monotypic genus *Birulatus* Vachon, described on the basis of a single female specimen collected in the south of Tafila, close to Shauback, 30° 31' 60" N, 35° 34' 0" E (see Lourenço, 1999).

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REFERENCES

BIRULA, A. A. 1908. Ergebnisse der mit Subvention aus der Erbschaft Treitl unternommenen zoologischen Forschungsreise Dr. F. Werner's nach dem Anglo-Aegyptischen Sudan und Nord-Uganda. XIV. Skorpiones und Solifugae. *Sitzungsberichte der kaiserlich-königlichen Akademie der Wisseuchaften*, Wien, 117 (1): 121-152.

BRAUNWALDER, M. E. & FET, V. 1998. On publications about scorpions (Arachnida, Scorpiones) by Hemprich and Ehrenberg (1828-1831). *Bulletin of the British Arachnological Society* 11 (1): 29-35.

FET, V. 1997. Notes on the taxonomy of some old world scorpions (Scorpiones: Buthidae, Chactidae, Ischnuridae, Scorpionidae). *The Journal of Arachnology* 25: 245-250.

FET, V. & LOWE, G. 2000. Family Buthidae C. L. Koch, 1837 (pp. 54-286). *In*: FET, V., SISSOM, W. D., LOWE, G. & BRAUNWALDER, M. E. (eds). Catalog of the Scorpions of the world (1758-1998). *New York, NY: The New York Entomological Society.*

FRANCKE, O. F. 1985. Conspectus genericus scorpionorum 1758-1982 (Arachnida: Scorpiones). *Occasional Papers of the Museum, Texas Tech University* 98: 1-32.

HEMPRICH, F. W. & EHRENBERG, C. G. 1828. Zoologica II. Arachnoidea. Plate I: *Buthus*; plate II: *Androctonus*. *In*: Symbolae Physicae seu Icones et Descriptiones Animalium evertebratorum sepositis Insectis quae ex itinere per Africam borealem et Asiam occidentalem. Friderici Guilelmi Hemprich et Christiani Godofredi Ehrenberg, medicinae et chirurgiae doctorum, studio novae aut illustratae redierunt. Percensuit et regis iussu et impensis edidit Dr. C. G. Ehrenberg. Decas prima. Berolini ex officina Academica, Venditur a Mittlero.

HEMPRICH, F. W. & EHRENBERG, C. G. 1829. Vorläufige Üebersicht der in Nord-Afrika und West-Asien einheimischen Skorpione und deren geographischen Verbreitung. *Verhandungen der Gesellschaft der naturforschender Freunde in Berlin* 1 (6): 348-362.

KRAEPELIN, K. 1891. Revision der Skorpione. I. Die Familie der Androctonidae. *Jahrbuch der Hamburgischen wissenschaftlichen Anstalten* 8: 1-144.

LEVY, G. & AMITAI, P. 1980. Fauna Palaestina, Arachnida I : Scorpiones. *Israel Academy of Sciences and Humanities, Jerusalem*, 130 pp.

LEVY, G., AMITAI, P. & SHULOV, A. 1970. *Leiurus quinquestriatus hebraeus* (Birula, 1908) (Scorpiones; Buthidae) and its systematic position. *Israel Journal of Zoology* 19: 231-242.

LOURENÇO, W. R. 1999. On the phylogenetic position of the genus *Birulatus* Vachon, 1973 (Scorpiones, Buthidae) and redescription of *Birulatus haasi*. *Zoology in the Middle East* 18: 109-113.

MODRY, D., AL-ORAN, R. M., AMR, Z. S. & NECAS, P. 1999. A new record of the Tilbury's spiny-footed lizard, *Acanthodactylus tilburyi* Arnold, 1986 (Reptilia: Lacertidae), from the Hashemite Kingdom of Jordan. *Casopis Narodniho muzea Rada prirodovedna* 168 (1-4): 121-124.

SISSOM, W. D. 1990. Systematics, biogeography and paleontology. (pp. 64-160). *In*: POLIS, G. A. (ed). Biology of Scorpions. *Stanford University Press, Stanford, California.*

SISSOM, W. D. 1994. Description of new and poorly known scorpions of Yemen (Scorpiones: Buthidae, Diplocentridae, Scorpionidae). *Fauna of Saudi Arabia* 14: 3-39.

VACHON, M. 1949. Etude sur les Scorpions. III (suite). Description des Scorpions du Nord de l'Afrique. *Archives de l'Institut Pasteur d'Algérie* 27 (2): 134-169.

VACHON, M. 1952. Etude sur les Scorpions. *Institut Pasteur d'Algérie, Alger*, 482 pp.

VACHON, M. 1963. De l'utilité, en systématique, d'une nomenclature des dents des chélicères chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle*, 2e sér. 35 (2): 161-166.

VACHON, M. 1966. Liste des Scorpions connus en Egypte, Arabie, Israël, Liban, Syrie, Jordanie, Turquie, Irak, Iran. *Toxicon* 4: 209-218.

VACHON, M. 1974. Etude des caractères utilisés pour classer les familles et les genres de Scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle*, 3^{e} sér. n° 140, *Zool.* 104: 857-958.

VACHON, M. 1975. Sur l'utilisation de la trichobothriotaxie du bras des pédipalpes des Scorpions (Arachnides) dans le classement des genres de la famille des Buthidae Simon. *Comptes Rendus des Séances de l'Académie des Sciences* 281 (D): 1597-1599.

VACHON, M. 1979. Arachnids of Saudi Arabia – Scorpiones. *Fauna of Saudi.*